COMP 2711 Discrete Mathematical Tools for Computer Science
2016 Spring Semester – Assignment # 3

Distributed: 26 February 2016 – Due: 4pm, 09 March 2016

Your solutions should contain (i) your name, (ii) your student ID #, (ii) your email address, (iv) your lecture section and (v) your tutorial section. Your work should be submitted before 7PM of the due date in the collection bin outside Room 4210 (Lift 21).

Problem 1: Six schools are going to send their basketball teams to a tournament at which each team must play each other team exactly once. How many games are required?

Problem 2: In how many ways can a nine-person club select a president and a secretary-treasurer from among its members?

Problem 3: In how many ways can a nine-person club select a two-person executive committee from among its members?

Problem 4: In how many ways can a nine-person club select a president and a two-person executive advisory board from among its members (assuming that the president is not on the advisory board)?

Problem 5: Using the formula for $\binom{n}{2}$ it is straightforward to show that

$$n\binom{n-1}{2} = \binom{n}{2}(n-2)$$

However, this proof simply uses blind substitution and simplification. Find a more conceptual explanation of why this formula is true. (Hint: Think in terms of officers and committees in a club.)

Problem 6: The local ice cream shop sells eleven different flavors of ice cream. How many different two-scoop cones are there? (The two scoops might be of the same flavor or of two different flavors. Following your mother's rule that it all goes to the same stomach, a cone with a vanilla scoop on top of a chocolate scoop is considered the same as a cone with chocolate on top of vanilla.)

Problem 7: Suppose you decide to disagree with your mother in Problem 6 – the order of the scoops does matter. How many different possible two-scoop cones are there?